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A THERMOMETER OVER THE SEA*

by N. Linko

This instrument still stands in the Laboratory of the Leningrad Branch of the Oceanographic Institute. Its marine element is a white polyethylene basin filled with water. Hanging over it, the instrument inspects below with its single lens. Soon it will be looking from on board an aircraft down onto the cold waves of the Baltic Sea: the radiometer is being prepared for its first flight tests.

In essence the thermometer is a small metal cube. In determining the water temperature, scientists have long used the ordinary graduated thermometer. But how much time was spent in scientific scrupulosity in compiling a thermal chart even of the Barents Sea? For similar purposes even the most modern vessel is too slow, and here is where we can talk about the effectiveness of the measurements. It is an altogther incompletable task to show the regularity of the temperature changes over large areas, say, in the course of days. A vessel proceeding in the waters investigated can itself affect the thermal chart. Even the thermometer has a certain degree of error. It would be ideal if the necessary results the scientists obtained did not rely on water. Can this be done?

"Certainly", says the assistant of the Oceanographic Institute, Ya. Ye. Leybovich. "Our radiometer is designed for this purpose. Imagine, as usual: an aircraft flies over the sea, and an instrument mounted on it continuously measures the water temperature over vast areas. In a definite time, for example, several hours, it can again return to this

same area to conduct a survey. Then it becomes possible to show the regularity in the temperature change in the open waters. It is true that the new radiometer offers data only on the temperature of the water surface. But without the knowledge of how the upper layers of the seas and oceans interact with the temperature, it is difficult to draw conclusions on the cause of weather changes."

"Woman, turn on the instrument", asked my host, laboratory assistant Ye. Belkov.

The switch clicked. The recording pen mounted along side wrote an even toothed line along the sheet.

The accuracy of measurements is within 0.2 degrees. This is great if one considers that the apparatus will operate at an altitude of 200-500 meters, explained Ya. Ye. Leybovich.

The ocean, the sea or a pond, as another other body, possesses thermal energy and, consequently, emits thermal waves. At those low temperatures, which interest oceanographers and meteorologists, this is infrared radiation. The instrument detects it with its lens, concentrates it in beams and converts it to electrical signals. They in turn lead the self-recording pen on the tape, characterizing the surface temperature of the water.

The most modern radiometer is a recently improved model. Four of its predecessors are operating in Sakhalin, the Kuriles, at the Baltic and Black Seas. In comparison with this small box, they are considerably

stronger, less reliable. However in spite of everything in a short time, they are successful in achieving a popularity among fishermen. Ichthyologist have long known that pelagic (surface) fish inhabit waters only of a certain temperature. The Colobabis fish for example, prefer 11 - 12 degrees, best of all. It is useless to seek its schools in waters of another temperature. Mackerel prefer 14.5 - 15.5 degrees. Before there were radiometers, this information was almost not used in commercial fishing. Pilots flew over vast expanses of seas looking from above for the dark shadows of schools. Much time and energy were required for their accidental detection. Now the aircraft's course is set over those places where the temperature necessary for a given species of fish exists.

The newest achievements of electronics are used in the latest version of the radiometer. How much better it is, tests over the Baltic Sea have shown. In two months, a similar instrument will be sent to the mouths of the Ob' and Yenisey Rivers. There, specialists from the Institute of the Arctic and the Antarctic will conduct a series of investigations which will prepare a mathematically based prognoses of the time for the breaking up and freezing of ice on the rivers.
